COMPARATIVE STUDY BETWEEN COMMERCIAL FEEDS AND THE MIXTURE OF RICE BRAN, CORN GRITS, COPRA MEAL, SOYBEAN MEAL AND FISH MEAL AS GROWTH FEEDS FOR BROILERS

A Research Paper
Presented to
The Faculty and Staff of
Philippine Science High School Western Visayas

In Partial Fulfillment of the
Requirement for Technology Research 2

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1998

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The research paper of Erees Queen B. Macabebe and Marichelle G. Montilla entitled "Comparative Study Between Commercial Feeds and the Mixture of Rice Bran, Corn Grits, Copra Meal, Soybean Meal and Fish Meal as Growth Feeds for Broilers" submitted in partial fulfillment of the requirements for Technology Research 2, is hereby approved.

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April 1998

ACKNOWLEDGEMENT

The researchers would like to express their gratitude to the following people without whose patience, encouragement and assistance this research paper would never have been accomplished:

Mr. Eduardo Ongcol
Ms. Josephine Cordero
Ms. Rose Elizabeth Acevedo
Mr. Nards Suteridano
Ms. Margarita Paciente
Ms. Josette Biyo
Ms. Lailani Estilo
Mr. Leo Pedregoza
Mr. Laurence Calambro
Ms. Chirell Yap

To our parents, brothers and sister who gave us their full support (moral, spiritual, emotional and FINANCIAL)

Mr. Efrenito D. Montilla
Mrs. Marilou G. Montilla
Ms. Marianne G. Montilla
Efren Louren G. Montilla
Mr. Rene E. Macabebe
Mrs. Elsie B. Macabebe
Mr. Clark B. Macabebe
Mr. Michael B. Macabebe

and to Jonas Adrian Cordova
who is remembered

THANK YOU VERY MUCH!!

Ers & Che

April 1998

ABSTRACT

Comparative Study Between Commercial Feeds and The Mixture of Rice Bran, Corn Grits, Copra Meal, Soybean Meal and Fish Meal as Growth Feeds for Broilers

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This study aimed at comparing the effectivity of commercial feeds and the mixture of rice bran, corn grits, copra meal, soybean meal and fish meal as growth feeds for broilers. Conducted from February to March 1998, two groups composed of five chicks were randomly selected. To gather data needed for the research, each component of the mixture was weighed before and after it was heated for one hour to determine the moisture content. Also, the mixture was fed to one group while the other group was fed with a commercial feed and the feeding was personally administered by the researchers. Statistical tools used were mean and t-test to determine the significant difference between the two feeds. The study found out that the mixture was less effective compared to the commercial feed in terms of liveweight. There was a significant difference and it was in favor of the commercial feed.

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CHAPTER 1

INTRODUCTION

Raising of broilers has gained much in the market lately. The demand on protein of animals grew and depend only on poultry meat. Broiler needs proper feeds to profit more in a short period of time to grow.

The most important factor in this production in many countries like the Philippines is the food supply. Almost 65% of the production goes to the feed contribution due to the high prices of these which are imported. Common sources of protein for poultry feeds are meat and other by-products, soybean meal, fish meal and copra meal.

Several studies have been conducted to discover the feeding ingredient that can best supply the protein requirement. It was the combination of rice bran, corn grits, soybean meal, ipil-ipil leaf meal and copra meal which are very abundant. Fish catch that are not consumed by people can be utilize as fish meal and become a source of protein. In coastal areas, oyster shells are abundant and could be used as source of calcium for egg-laying broilers (Buncag, 1989).

Although local ones have lower value than the imported feed, if combined with the other foodstuff will have similar effect on poultry production.

Researchers have also confirmed that this locally produced feed is recognized as very economical and nutritious ingredients with a high quality poultry ration. Scientists pointed out these proper combination of local ingredients obtained a good growth and reproduction.

However, factor that were considered are quality of ingredients, nutritious content and metabolic inhibitor. Through this right combination of the ingredient, the utilization of local feeds will reduce the incoming imported goods.

Technology had increased the production of feeds to meet the livestock and poultry needs. Farmers should take part on the stabilization of feeds for economic purposes not only for livestock and poultry, but also for the communities in the farm. So the fact that the utilization of by products like rice bran, corn grits, copra meal, soybean meal crushed oyster shells and fish meal will increase the growth of the chicken better

than that of commercial feeds will convince poultry raisers to utilize these by products for their own use.

Statement of the Problem

Can the mixture of rice bran, corn grits, copra meal, soybean meal and fish meal be more effective as growth feeds compared to the commercial feeds for broilers in terms of liveweight?

Hypothesis

There is no significant difference between the commercial feeds and the mixture of rice bran, corn grits, copra meal, soybean meal and fish meal in terms of its effect measured thru liveweight but can still be a substitute as growth feeds for broilers.

Objectives

The objectives of the study are as follows:

1) To utilize rice bran, copra meal, soybean meal and fish meal and other waste materials as feeds for broilers,

2) To produce an economical, effective and nutri tious product as poultry feeds,

3) To determine the physico-chemical characteristics of the feeds such as moisture content, protein content and shelf-life.

4) To determine whether the product is effective compared to the commercialized feeds in terms of liveweight through statistical instruments.

Significance of the Study

Feeds that are commercially produced are costly and besides, good quality feeds are sometimes not available locally. Hence, poultry raisers could hardly obtain better quality feeds in order to produce quality poultry meat and other poultry product (Buncag, 1989).

Most poultry farms are located on rural areas wherein coconut plants are abundant and are made into copra, and rice bran from a local rice mill is plentiful, instead of disregarding these materials, it can be utilized as feed for broiler and, maybe, for other poultry animals.

Since the object of broiler production is to produce quality meat at the lowest possible cost and since these by products are available, and can be utilize as feeds, it

will lessen the expenses a poultry owner would have to spend. Although some of these by products do not have the essential nutrient broiler needed, some of the by products used contain these nutrients and a certain amount of vitamin-mineral premix will be added so that the feed will have the nutrients required for broilers.

Scope and Limitation of the Study

The mixture was made and the qualitative analysis was conducted at the Philippine Science High School laboratory provided all materials and equipment are available with the duration of one week only. This study utilized only rice bran, corn grits, copra meal, soybean meal, crushed oyster shells and fish meal. The feeding was conducted in Pavia with a duration of 30 days only. The chicken that was used was Pilch broiler.

Definition of Terms

The following terms were defined for better understanding of the study.

Copra Meal. "copra meal" is the meat left after coconut milk and oil is extracted from

it and had undergone the process of sun drying.

Corn Grits. "corn grits" are corn made into small pieces usually comprises the main ingrediant for poultry feeds.

Fish Meal. "fish meal" are manufactured out of fish materials. Dried small fishes of various species of mixed constituency are the common materials used in the manufacture of fish meal.

Liveweight. "liveweight" is the final weight of the broiler after the whole process of feeding upon maturity.

Matured Coconut. "matured coconut" are the coconut wherein the meat is already thick and its husk is already matured and starting to turn brown.

Poultry. "poultry" is used to designate a group of domesticated birds like chickens, turkeys, ducks, pigeons, quails and geese which render man economic value.

Rice Bran. "rice bran" is the outer covering of rice grains.

Soybean. "soybean" refers to the pod of beans (*Glycine max*) used in the experiment.

Soybean Meal. "soybean meal" is used as a protein substitute in many poultry feeds. Composed of dried, crushed soybeans.

Soybean meat. "soybean meat" is the outer green skin surrounding the beans.

Stench. "stench" is refers to a foul or odorous smell.

Statistical Tools

Mean. Mean was used to obtain the weighted average of liveweight.

t-test. This was utilized to determine the differences in weight of the each chicken in cage A with those in cage B.

CHAPTER 2

REVIEW OF RELATED LITERATURE

Poultry farming is a well known and a wide-spread business. Many studies had been conducted out of poultry farming. This chapter presents the review of related studies which may authenticate the statement of the study.

For every animal there is an optimum amount and balance of foods or nut that will produce peak physical condition, growth rates and in the case of chicken productivity (Poshlman, 1977).

Portsmouth and Marangos stated that feed is the fuel a bird uses to grow, produce eggs and put on meat. They further stated that birds primarily eat to satisfy their energy need, thus the ratio needs to be balanced so that intake all nutrients is maintained at their correct level (Portsmouth et. al., 1987).

Bundy stated that chicks especially broilers require ration containing 22 to 24 percent protein during the first few weeks, and that the protein must be high in quality. He further noted that the muscular tissue

produced in chicks and broilers are largely made up of protein. Starter and grower mashes must be high in protein content with at least thirteen amino acids are sufficient. Arginine, lysine, methionine and tryptophan may be critical in some rations. To guard against protein deficiency, three of the four different protein supplements should be included in the ratio. Milk products, meat scraps, fish meal, seaweed meal and corn gluten meal are good feed to include in the chicks and broiler rations (Bundy, 1975).

According to Labadan, protein is essential in livestock feeding because it helps maintain life and repair worn out tissues (Labadan, 1979).

It was further mentioned by Villegas that feeds rich in protein contain the essential amino acids that are capable of maintaining life and growth of the animals (Villegas, 1969).

As classified by Fronda, meat and meat preparations are protein rich foods and necessary in animal ration (Fronda, 1980).

Morrison stated that there is no danger in feeding farm animals with considerably larger amount of protein than is actually

required. It was further mentioned that if animals are fed with protein feeds there is no injurious result but rather retained normal gains and remained in good health from 30% to 42% level protein. He also mentioned that to obtain best results in animal health, protein with poor quality must be supplemented with other protein rich foods (Morrison, 1959).

Smith, Fornics and Fritz stated that the object of broiler production is to produce edible meat at the lowest possible cost. Feeds and feedings are the most important factor in broiler production. The use of commonly available foodstuff should be restored since homemade rations are nutritionally comparable to commercial mixed mash at the same time the cost is relatively lower (Smith et. al., 1965).

Based on a study conducted by Sarella, feeding broiler containing 20% protein for eight weeks duration increases the liveweight gain, consumption, dressing percentage and profit of Yanacre broiler (Sarella, 1973).

Card and Neshiem observed that copra meal can provide a useful protein for poultry provided the lysine and methionine deficiency

in the ration is corrected. Likewise, the quality of copra meal can be improved if it is treated with sodium propionate (Card et. al., 1992).

Santos also stated that copra meal is poor in lysine but rich in arginine, histidine and lystine (Santos, 1972).

Copra meal, as mentioned by Sevilla, contains 21.7% crude protein and 8.6% fats (Sevilla, 1986).

Capuz mentioned that locally produced fish meal contains portion ranges from 40%-60%. He further noted that result of the research at Araneta Institute of Agriculture between local and imported fish meal was found insignificant (Capuz, 1975).

Eusebio stated that corn is one of the sources of energy feed which is widely used as a standard fed for swine and poultry. He also stated that rice bran is commonly cheap and is readily available throughout the Philippines (Eusebio, 1978).

Alcantara also stated that rice bran is palatable and high in energy and calories but low in protein, minerals and vitamin A level of 20-25 percent in the ration (Alcantara, 1976).

Villegas stated that protein of both whole and polished rice are highly digestible. Although the amount of protein in whole rice grain is low, their biological value is comparable to that of wheat, oat and corn (Villegas, 1969).

Coligado stated that a good feed mixture of poultry would normally contain 50% corn, whereas for swine the diet normally contains 35%. He further mentioned that yellow corn is the most popular grains used for poultry feeds. It contains 9 to 10 percent crude protein, and it is highly digestible, palatable and it contains vitamin A and yellow pigmenting compound (Coligado, 1971).

It has been reported by Cerpacio that yellow corn is a major source of carbohydrates and a principal ingredient in forming a ration in which it is used to supply available energy. Corn contains carotene, a precursor of vitamin A which is needed for normal growth and low fiber content, a typical characteristic of high energy ingredient (Cerpacio, 1973).

The findings at the UP College of Agriculture showed that ipil-ipil leaf is high in protein and carotene. It had been

conclusively proven that ipil-ipil leaf meal can be adequately substitute a poultry feed ingredient. However, the levels of ration should not exceed 10% as it contains mimosine (Duy, 1970).

Morrison wrote that among plant sources, soybean is the richest in protein with a fat content of 18%, phosphorus content of .25% and fiber content of 5% (Morrison, 1959).

Soybean meal, according to Dagoon, is considered the most valuable protein material for feed composition. It can be used to replace fish meal and meat meal in various feed preparations for both poultry and livestock. Although it is a little deficient in minerals especially calcium, the addition of mineral bearing ingredients like sea shell grits and sea shell flour eliminates problem of mineral deficiency (Dagoon, 1986).

Card also noted that soybean meal is unique among plant protein sources because it is a good source of lysine. He further stated that soybean meal, if it contains most of soybean hull, has 44% protein while dehulled meal is most commonly used in poultry feeding because it has high energy value than the meal containing 44% protein (Card, 1957).

Simplicio cited that the utilization of local feed materials such as corn, soybean, ipil-ipil as feeding when mixed together for a given class of swine and poultry is economical (Simplicio, 1973).

The proteins, fats, and carbohydrates in dried foods are present in larger amount per unit weight than their fresh counterparts, and the nutrient value of most reconstituted or rehydrated foods is comparable to that of fresh items. The biological value of dried protein is dependent, however, on the method of drying. Prolonged exposure to high temperature can render the protein less useful in the diet. Low temperature treatment, on the other hand, may increase the digestibility of protein (McHenry, 1992).

Commercially blended feed is available for every type of poultry but if you feed your chicken with commercial mixes exclusively, their eggs and meat will taste much the same as store bought (Reader's Digest, 1986).

These related literatures helped establish the relevance of the by products that will be used as ingredients in the study

of feeds for broiler and other poultry animals.

CHAPTER 3

METHODOLOGY

Chapter Three presents the step by step procedure that the researchers followed when they made their mixture as broiler feed.

Materials

- Rice bran from a nearby rice mill.
- Copra meal (recycled).
- Commercialized corn grits.
- Soybeans from the market.
- Locally produced fish meal.
- Crushed oyster shells.

Equipment

- 5 flat, spacious containers made of bamboo for drying the by products.
- 2 small basin
- Cloth for extracting milk from coconut
- Glass container for the mixture
- Mortar and pestle

Procedures

A. Preparation

- *How to prepare the copra meal*

Make sure that the copra meal is free of oil. Put the copra meal in a bamboo container then sundry for two days. Do not place directly under the heat of the sun because the copra will lose its essential nutrients

- *How to prepare the fish meal*

The process that will be used in making the fish meal is based on the method used by most fish pond owners. It is a very convenient method since the materials are common and they no longer need hi-tech equipment to produce it.

Rinse the fish with salt water. Aside from dehydration, the salt water will help preserve the fish. Place it on the container and sundry. After drying the fish, pound it using mortar and pestle.

- *How to prepare the Soybean meal.*

Using the meat grinder, grind the beans then air-dry. Do not expose directly to the sun because the use of protein will be lesser when exposed too much under the sun.

B.Mixing

After preparing the copra meal, fish meal and soybean meal, make sure that the rice bran and corn grits are dry before making the mixture. Take note that the desired mixture is composed of 25% rice bran, 25% corn grits, 20% copra meal, 15% soybean meal and 15% fish meal.

The 1-kilogram mixture contains 250 g rice bran, 250 g corn grits, 200 g copra meal, 150 g soybean meal and 150 g fish meal. The moisture content of some of the components were determined. The mixture was then placed in a glass container and was mixed carefully but thoroughly. Cover the container so that air will not interfere with the contents.

C.Feeding

In the experimentation, twelve (12) chicks were fed with starter mash from a local store for a period of 20 days. On the 20^{th} day, by random sampling, six (6) chicks were picked out among the 12 chicks and were placed in a cage labeled A. While the cage of the remaining chicks was labeled B. After segregation, the initial weight of each of the chicks from both cages were obtained for

statistical analysis. Each chick was tied with different colored band on their feet for identification and monitoring of the weight of each chick for the next five days and the first 10 days of feeding. The chicks in cage A are the experimental and were fed with the mixture while the chicks in cage B are the control and were fed with the same amount of commercial feeds for the next 10 days. Both cages were supplied with the same amount of water daily. The weight of each chick was obtained after 5 days and again after 10 days. This was to test whether there is a significance difference in growth between the experimental and the control.

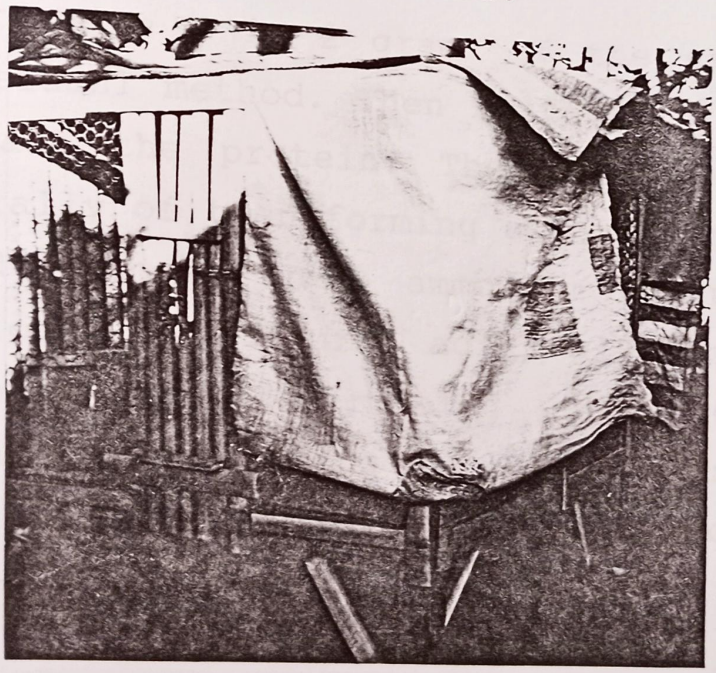

Figure 1: the cage

Qualitative Analysis

This are the methods that the researchers followed to determine the quality of the product through the following:

A. Moisture Content (percentage)

To obtain the moisture content using the vacuum oven method, weigh an empty dish in a triple beam balance. Add 5 grams of the sample and heat in the oven for one hour. Cool and weigh to constant weight then calculate its moisture content using this formula:

$$\% \text{ moisture} = \frac{\text{initial wt - final weight}}{\text{wt. of sample before heating}} \times 100$$

B. Protein Content

Determine N in 2 grams of the sample by the Kjeldahl method. Then multiply N by 6.38 to obtain the protein. The method consists essentially of transforming all nitrogen in a weighed sample into ammonium sulfate by digestion with sulfuric acid, alkalizing the solution, and determining the resulting ammonia by distilling it into a measured volume of standard acid, the excess of which is determined by titration.

C. Shelf-life

The shelf life of the product will be determined by its appearance and odor. If the product shows that there are molds present and if the odor is stench, then it is no longer suitable broiler feeds.

CHAPTER 4

RESULTS, CONCLUSION AND RECOMMENDATION

Qualitative Analysis

A. Moisture Content

Table 1

By-product	Initial wt	Final weight	% moisture
Copra meal	5 g	4.59 g	0.79%
Fish meal	5 g	4.30 g	1.61%
Soybean meal	5 g	4.61 g	0.95%
Corn grits	5 g	4.65 g	0.83%

Table 1: Shows that the moisture content of some of the components is less than 2 %. The purpose of this is for storage and longer shelf life.

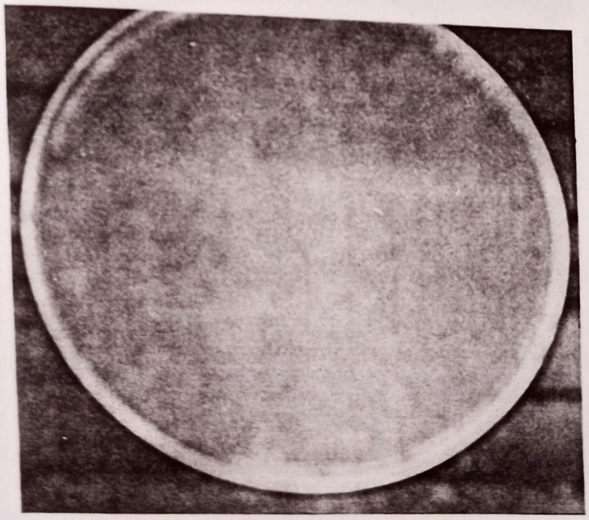

Figure 2: rice bran

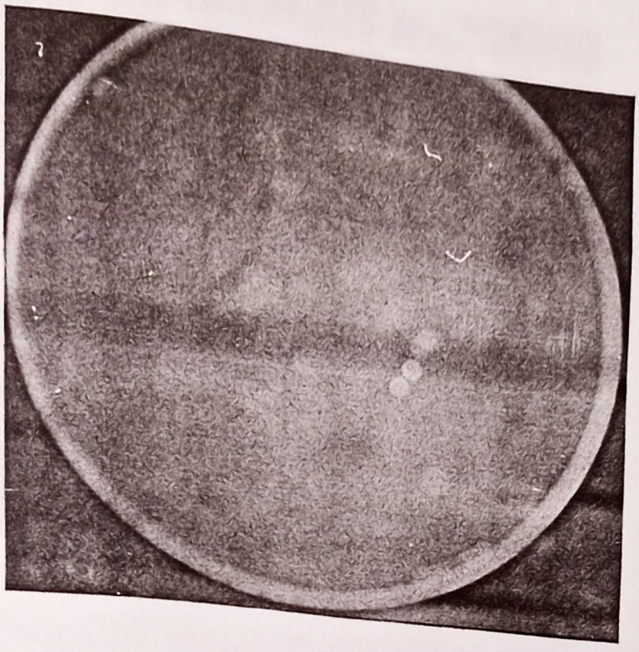

Figure 3: crushed soybeans

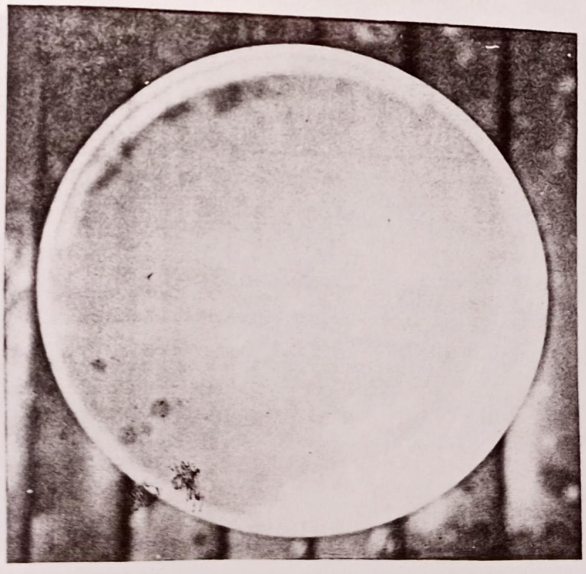

Figure 4: copra meal

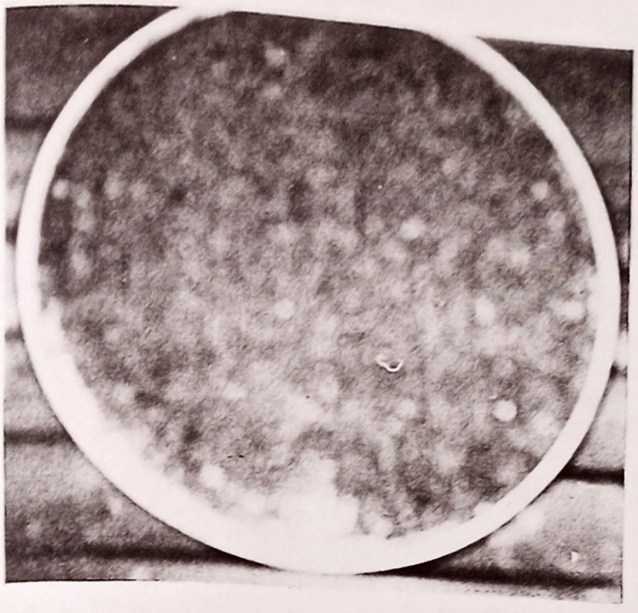

Figure 5: fish meal

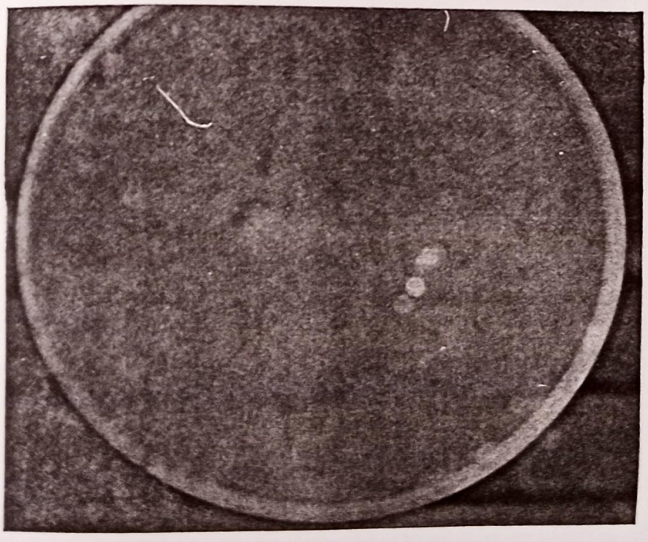

Figure 6: corn grits

B. Protein Content

The method provided by the researchers is not possible because the machine needed is not available and there is no alternative method that is currently applicable to determine the protein content.

C. Shelf-life

The mixture remained unspoiled for 4 months. It was contaminated because the container where the mixture was placed was not secured properly, so insects were able to enter and spoil the feed. It is advisable to use container with tight cover.

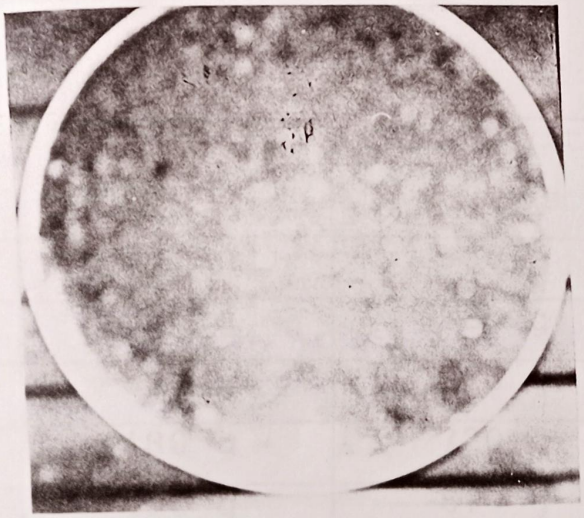

Figure 7: the mixture

Liveweight

Table 2

Chick #	Initial wt. (20^{th} day)	Weight after 5 days	Weight after 10 days
1	620 g	730 g	900 g
2	330 g	420 g	630 g
3	570 g	740 g	850 g
4	560 g	670 g	780 g
5	420 g	550 g	710 g
6	610 g	770 g	920 g

Table 2: Shows the liveweight of the chicks in cage A (experimental) on the 20^{th} day, after 5 days and after 10 days of feeding with the mixture.

Table 3

Chick #	Initial wt. (20^{th} day)	Weight after 5 days	Weight after 10 days
1	600 g	900 g	1150 g
2	590 g	820 g	1170 g
3	600 g	910 g	1180 g
4	480 g	720 g	980 g
5	400 g	670 g	900 g
6	620 g	880 g	1100 g

Table 3: Shows the liveweight of the chicks in cage B (control) on the 20th day, after 5 days and after 10 days of feeding with commercial feeds.

Figure 8: 10 days old chick

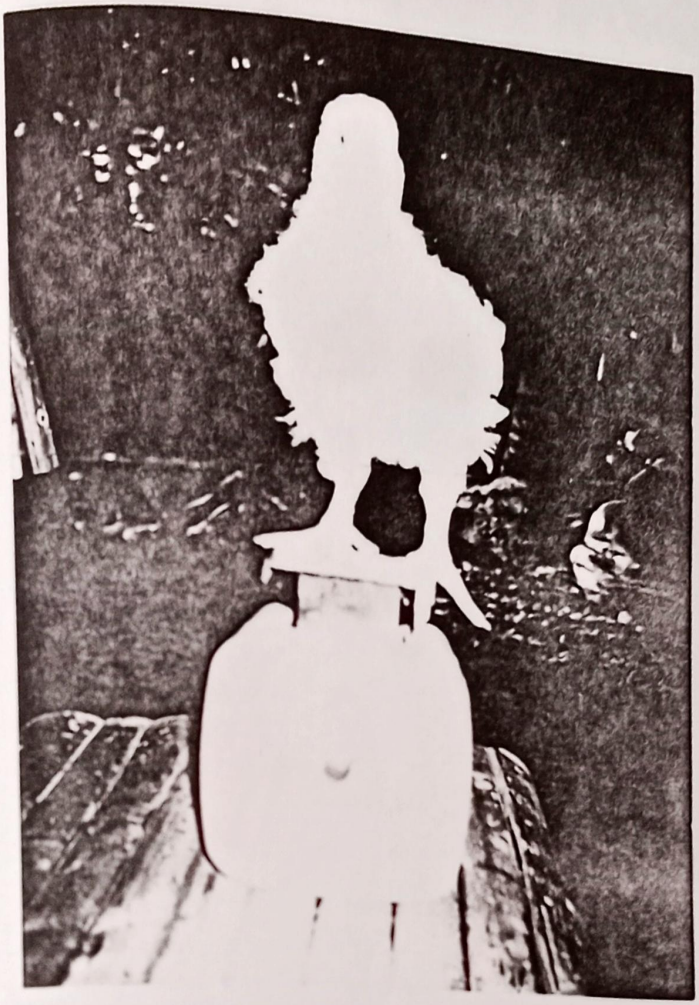

Figure 9: 20 days old chick

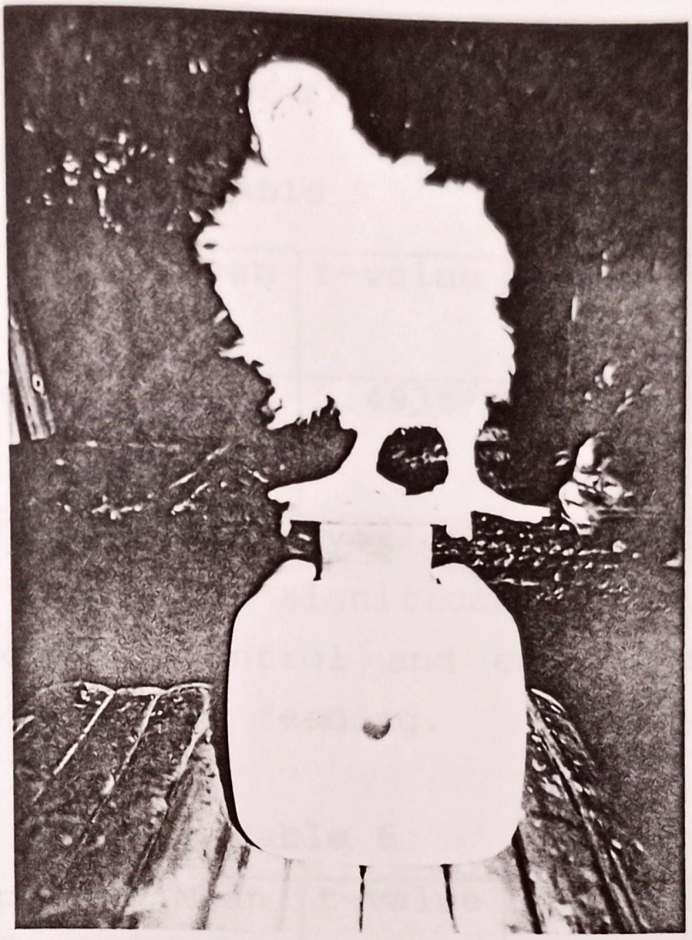

Figure 10: 25 days old chick

Statistical Analysis

Table 4

Group	Mean	t-value	Proba-bility	Diff.
Experimental	128.3	8.9630*	2.1E-6	148.3
Control	276.6			

*significance in favor of the control

Table 4: Shows the significant difference in growth between the control and the experimental for the first 5 days of feeding.

Table 5

Group	Mean	t-value	Proba-bility	Diff.
Experimental	151.6	2.4936*	0.0159	153.3
Control	305.0			

*significance in favor of the control

Table 5: Shows the significant difference in growth between control and experimental for the next 5 days of feeding.

Table 6

Group	Mean	t-value	Proba-bility	Diff.
Experimental	280.0	4.5361*	5.4E-4	301.7
Control	581.7			

*significance in favor of the control

Table 6: Shows the significant difference in growth between control and experimental for the first 10 days of feeding.

Conclusion

Based on the findings, this conclusion was advanced:

1.The mixture of rice bran, corn grits, copra meal, soybean meal and fishmeal was not an effective growth feeds compared to commercial feeds in terms of liveweight but can still be used as growth feeds for broilers.

Recommendation

Based on the conclusion, this recommendation was advanced:

1. The mixture of rice bran, corn grits, copra meal, soybean meal and fishmeal must be used as a substitute growth feeds only but cannot expect to have better results than the commercial ones since the mixture has a different smell and taste that the chickens are not used so at first they ate a little but later on they were able to adjust.

2. The mixture must be composed of by products of the said combination so as to help convert these waste into useful ones.

3. The mixture must be fed to have a more economical and nutritious growth feeds.

4. Finally, to have good results, the mixture mused be stored n a container with a tight cover so as to maintain the nutrients it contain.

CHAPTER 5

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